Concrete Schoolhouses

Precast Concrete Stone Entrance
Healdsburg, Calif., High School
William H. Weeks, Architect

Published by

PORTLAND CEMENT ASSOCIATION

Some School Building Fire Hazards

THE *American Exchange and Review*, Philadelphia, Pa., calls attention to the fact that fire losses on schoolhouses, which have been excessive for a number of years, are steadily increasing.

Some measure of the cause for this is partly explained by the fact that modern educational methods have introduced new hazards into schools. Manual training departments bring practically a factory hazard. Kitchens are provided for domestic science work and in some cases for the preparation of meals for pupils. Motion picture machines are in general use for educational and entertainment purposes. Chemical and physical laboratories introduce other hazards. In addition there is the increased use of school buildings for public meetings and entertainments of various kinds, involving the lighted cigar and cigarette hazards. While these conditions apply chiefly to schools in the larger centers, nevertheless many of the features mentioned are being introduced in the small-town and even in the township school.

Improved construction, better caretaking and more watchfulness are the principal remedies for reducing the excessive schoolhouse fire hazard. In general, the record of Ohio shows up better than that of any other state where the fire loss among schools has been carefully studied. This is attributed to the superior building laws of that state applying to schoolhouses, which were enacted after the burning of the Collingwood school in which nearly 150 children lost their lives. The Ohio law requires that all school buildings more than two stories high shall be of fireproof construction. In addition fire prevention regulations are strictly enforced by the State Fire Marshal through careful inspection of schoolhouse risks.

No community should defer safeguarding the lives of large numbers of children until the lesson of fire-safe construction is driven home by criminal sacrifice of human lives.

Concrete Schoolhouses

Fire-safe, Attractive, Permanent

Are Your Schools Fire-Safe?

"THERE are only two classes of buildings," says the Wisconsin Industrial Commission, "where attendance is involuntary—schools and jails."

If the house or apartment where you live is a fire-trap or is unsanitary, you can move. If you know a certain hotel or theater is not properly safeguarded against fire, you need not patronize it.

Factory owners are compelled by law to safeguard their workers. Periodical inspection is made to enforce all statutes directed toward prevention of fire and safety to life. Insurance underwriters even refuse insurance unless certain minimum standards of fire protection construction requirements and means of escape from fire in an emergency are provided.

School buildings are public property. The burden of responsibility for their proper construction is not with individuals who can be reached in a direct and positive way. The personnel of school boards changes, but the responsibility for expenditures for maintenance and even for calamities that are altogether too frequent should not be shifted to other shoulders.

The National Fire Protection Association, Boston, is responsible for the statement that "in the United States a fire occurs every day in some school." Anyone who carefully investigates the subject will realize that the American people have given less thought to safeguarding the young lives in schools from the perils of fire than has been given to factory buildings.

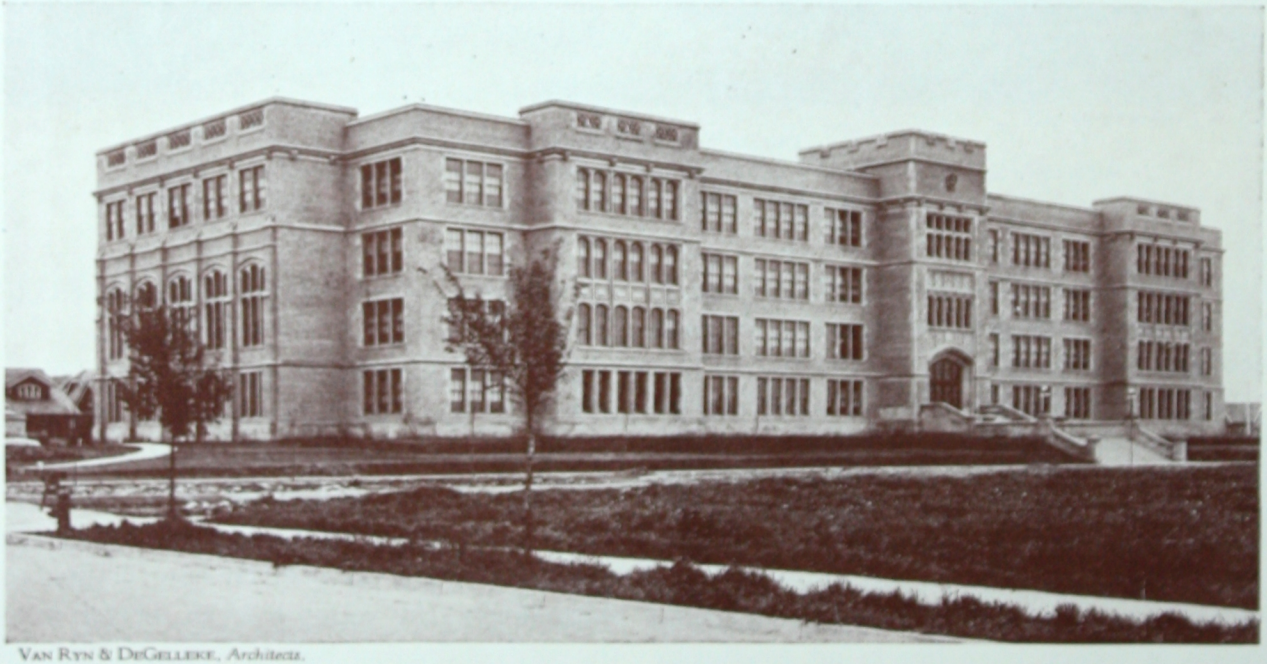
JOHN J. DONOVAN, *Architect.*

Durant School, Oakland, Calif.

In this modern and attractive concrete school the pupils' security and comfort are safeguarded through the fire-resistive and permanent qualities of concrete.

Jefferson School, Salt Lake City, Utah.

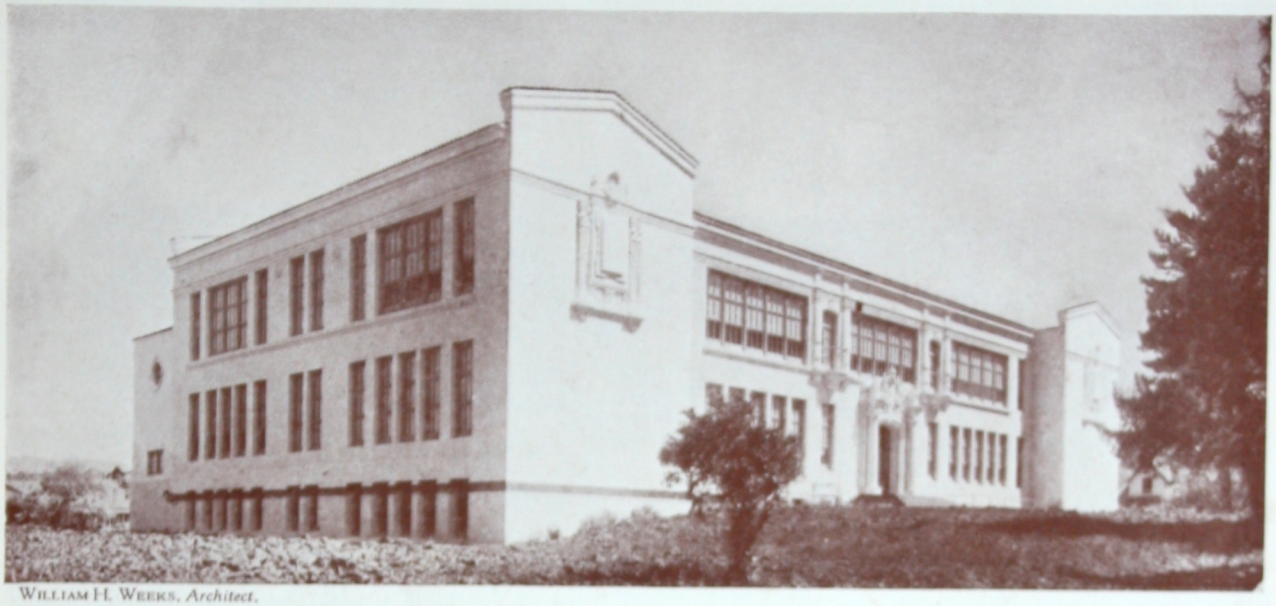
Main building and power plant can safely be built as a single unit when the fire hazard has been eliminated through concrete construction.



VAN RYN & DEGELLEKE, *Architects.*

Washington High School, Milwaukee, Wis.

An abundance of daylight is afforded in the classrooms of this modern concrete high school building



WILLIAM H. WEEKS, *Architect.*

High School, Healdsburg, Calif.

This monolithic concrete building expresses strength, beauty and dignity. The entrance way, of which a detailed view is shown on the cover of this booklet, is executed in precast concrete units.

Most Schools Are Fire-Traps

ANYWHERE one can find schools built with no thought of fire protection through the use of fireproof materials. Generally the only evidence of protection against fire is in the provision of some means of escape, which may or may not prove sufficient or usable when the panic caused by immediate danger from fire makes the children practically helpless. Any means of escape provided is usually on the assumption that sooner or later some such means will be needed, yet evidence is lacking that the provision will be sufficient or usable when the urgent need does arise.

The best means of escape should always be provided, but all such means in themselves fall far short of solving the problem of maximum fire-safety. This can only be secured by building the school so that it cannot burn, in which case fire that may break out in any part can never reach dangerous proportions.

OLIVER P. DENNIS, *Architect.* PACIFIC CONCRETE CO., *Builder.*

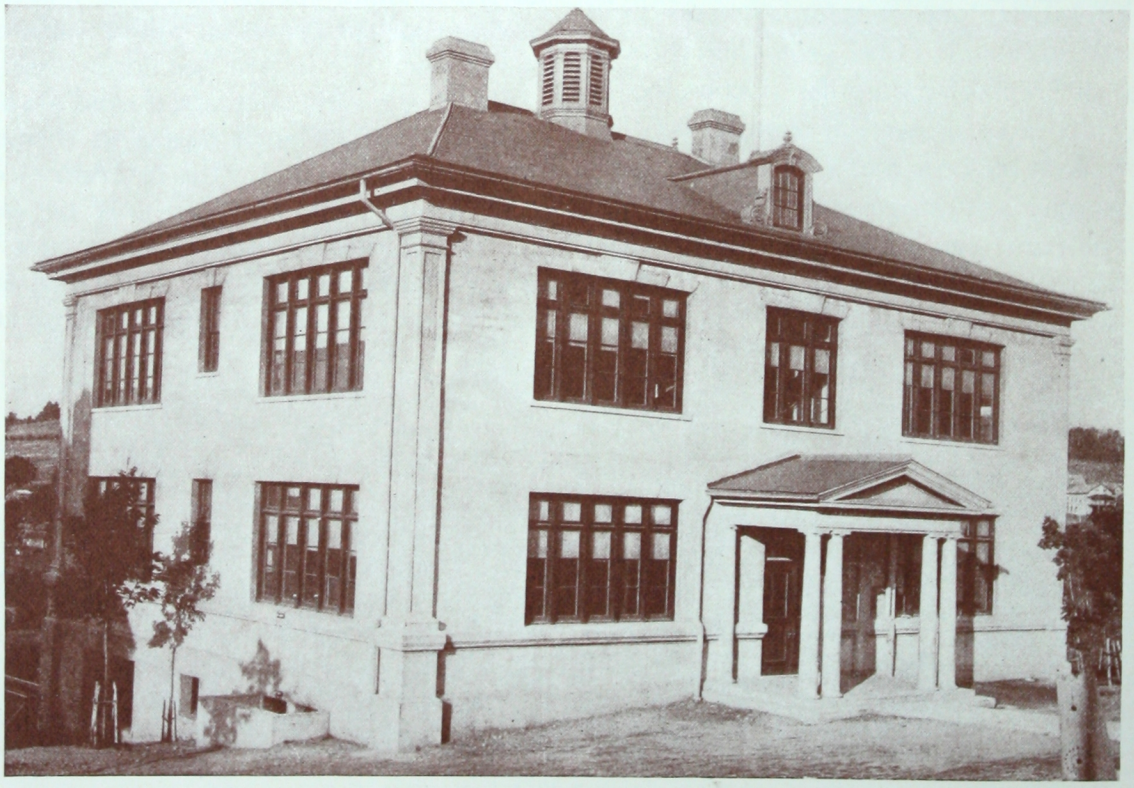
Culver City Grammar School, Culver City, Calif.

The community in which this school building of structural concrete is located, gained through its erection a permanent addition to its wealth without any fire hazard.

KELLY & WILLIAMS, *Architects.* LOUNSBERRY & MCLEOD, *Builders.*

Morgan Park Public School, Duluth, Minn.

The strong lines of its design emphasize the permanent character of this school building of structural concrete frame with exterior and interior walls of concrete brick.



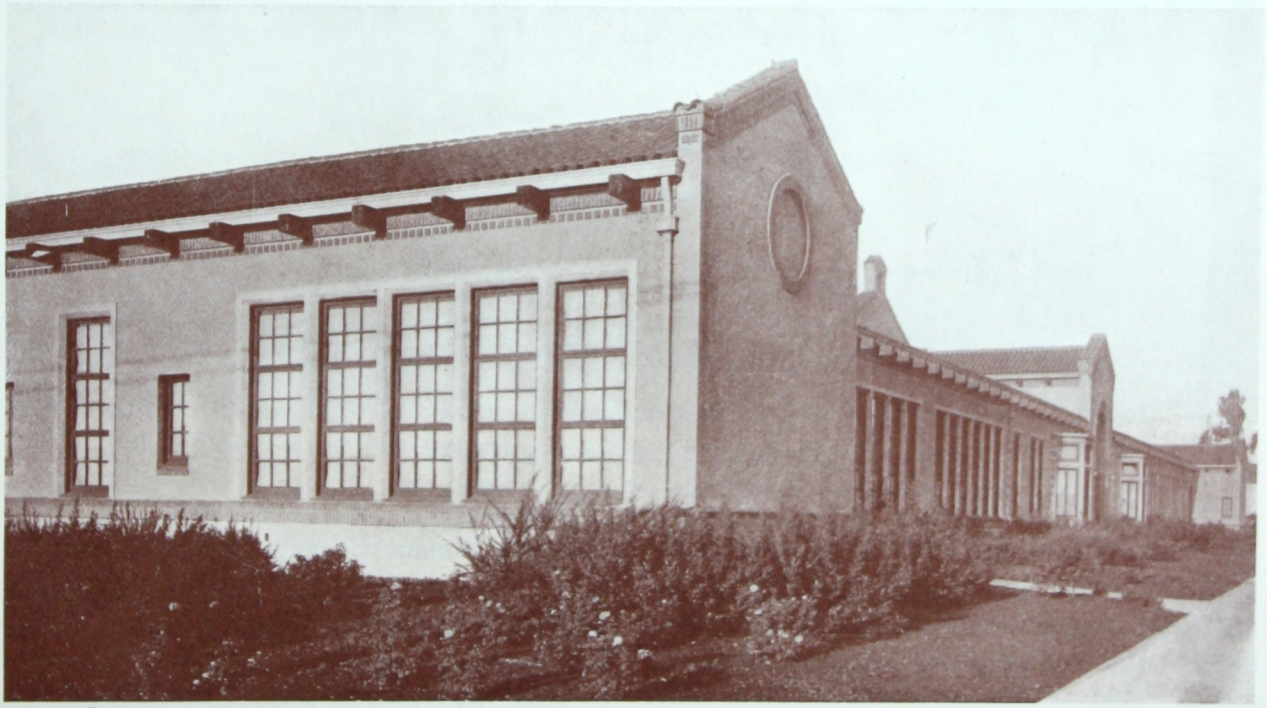
Public School Building, Mineville, N. Y.

Small cities and towns also find concrete construction a satisfactory type for their school buildings.

JOHN J. DONOVAN, *Architect.*

Lockwood School, Oakland, Calif.

This one-story concrete school building is built around four sides of a rectangle and provides an outside exit for every room. A playground for small children is provided in the enclosure formed by the building.



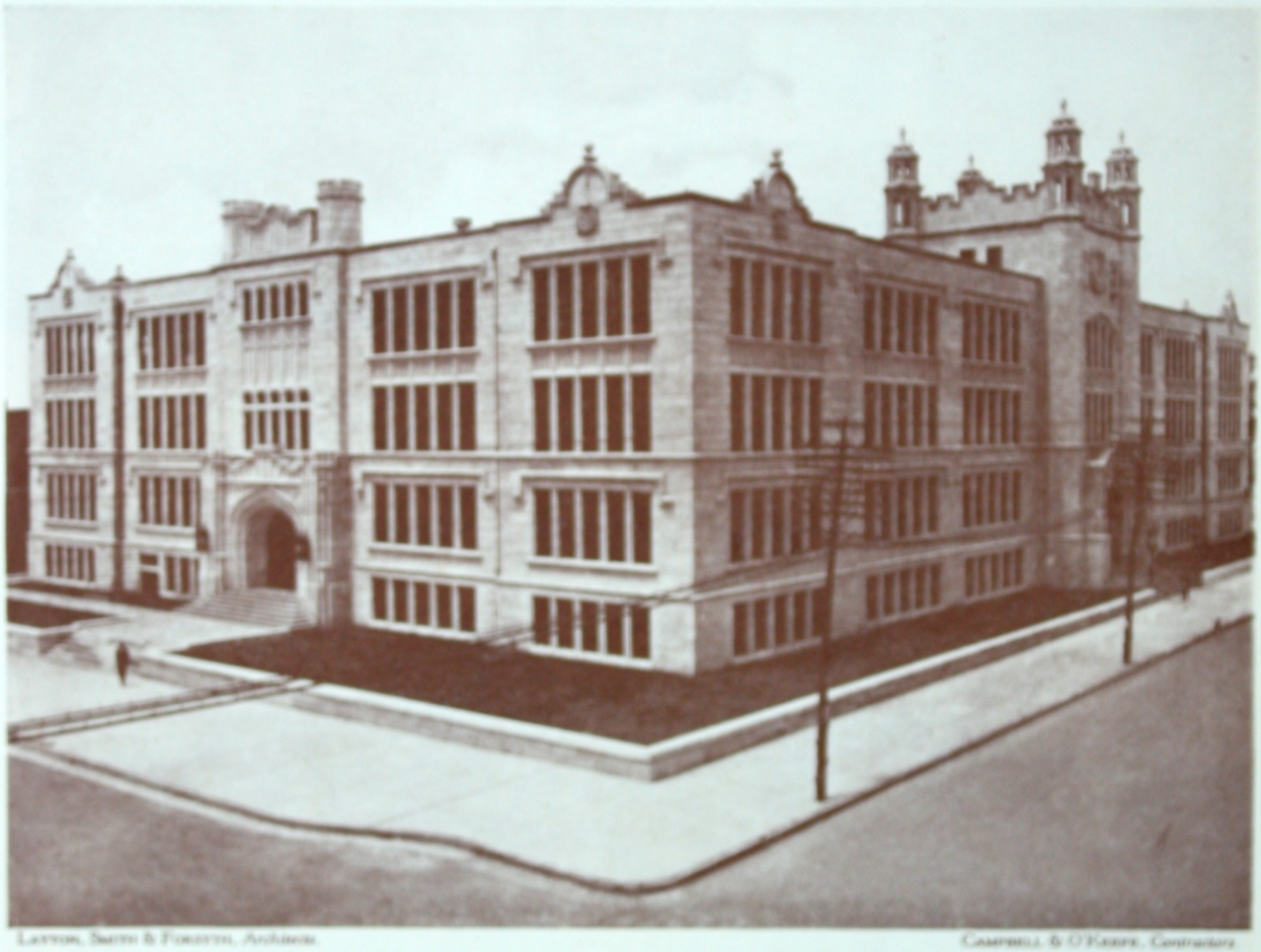
JOHN J. DONOVAN, *Architect.*

Emerson School, Oakland, Calif.

Modern ideas of permanence and fire safety are embodied in this one-story concrete school building.

Schools Can be Built Fire-Safe

CONCRETE is recognized as the highest type of fire-safe construction. It is the last word in fire protection. In a properly planned school building in which concrete has been consistently used throughout, fires of dangerous proportions are practically impossible. Numerous cases are on record of fires threatening serious consequences, that were confined to their place of origin by concrete floors and walls. Many times concrete buildings have acted as fire barriers in stopping the progress of conflagrations. No community should allow its chosen official representatives to provide less than the maximum of fire-safety for school children. Every community should insist that its school buildings, whether public or semi-public, be examples of the highest type of fire-safe construction.



LAVOIE, SMITH & FORSYTH, Architects. CAMPBELL & O'KEEFE, Contractors

High School, Oklahoma City, Okla.

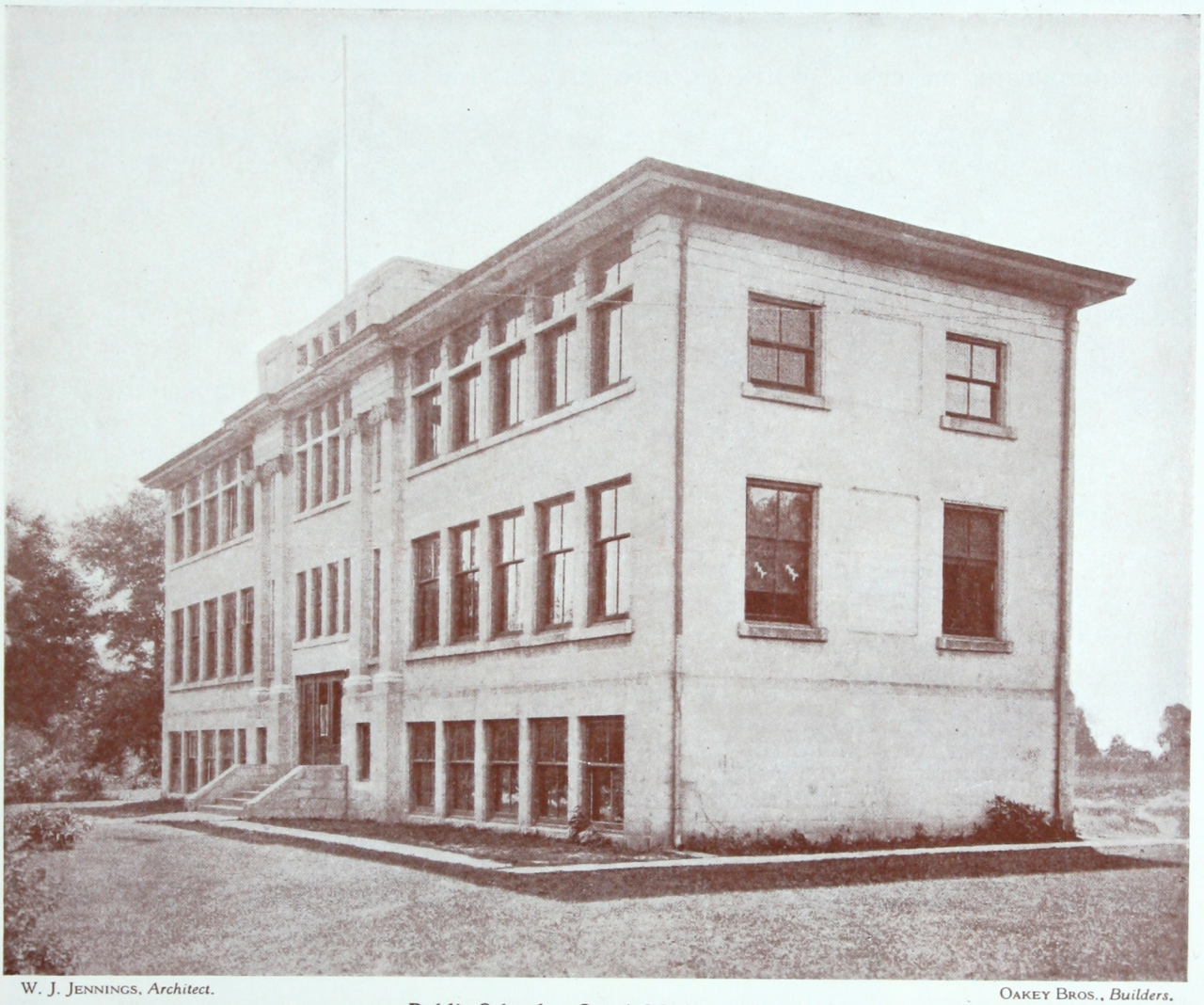
The investment of public funds in a large school building is best safeguarded by a consistent use of concrete.

Concrete Means Ultimate Economy Also

NOT only does concrete assure maximum fire-safety, but greatest economy. Under no circumstances should first cost be considered the true cost of a school building. The true cost is the ultimate cost to the community over a period of years. Ultimate cost includes:

1. First cost
2. Maintenance
3. Insurance
4. Interest on first cost
5. Depreciation of the building as a whole.

Since schools have burned in the past, they will burn in the future, so there is a fire hazard. If the building burns it may be a total loss to the community. The cost of insurance must not be omitted from any consideration devoted



W. J. JENNINGS, *Architect.* OAKEY BROS., *Builders.*

Public School at South Madison, Wis.

Concrete block as a construction material for school buildings has proved to be an economical investment in this attractive structure erected in 1909.

Annual taxes are levied to meet appropriations for interest and maintenance charges. Practice with respect to carrying insurance on school buildings varies, but in many cases is allowed to take care of itself—a procedure not countenanced by business organizations.

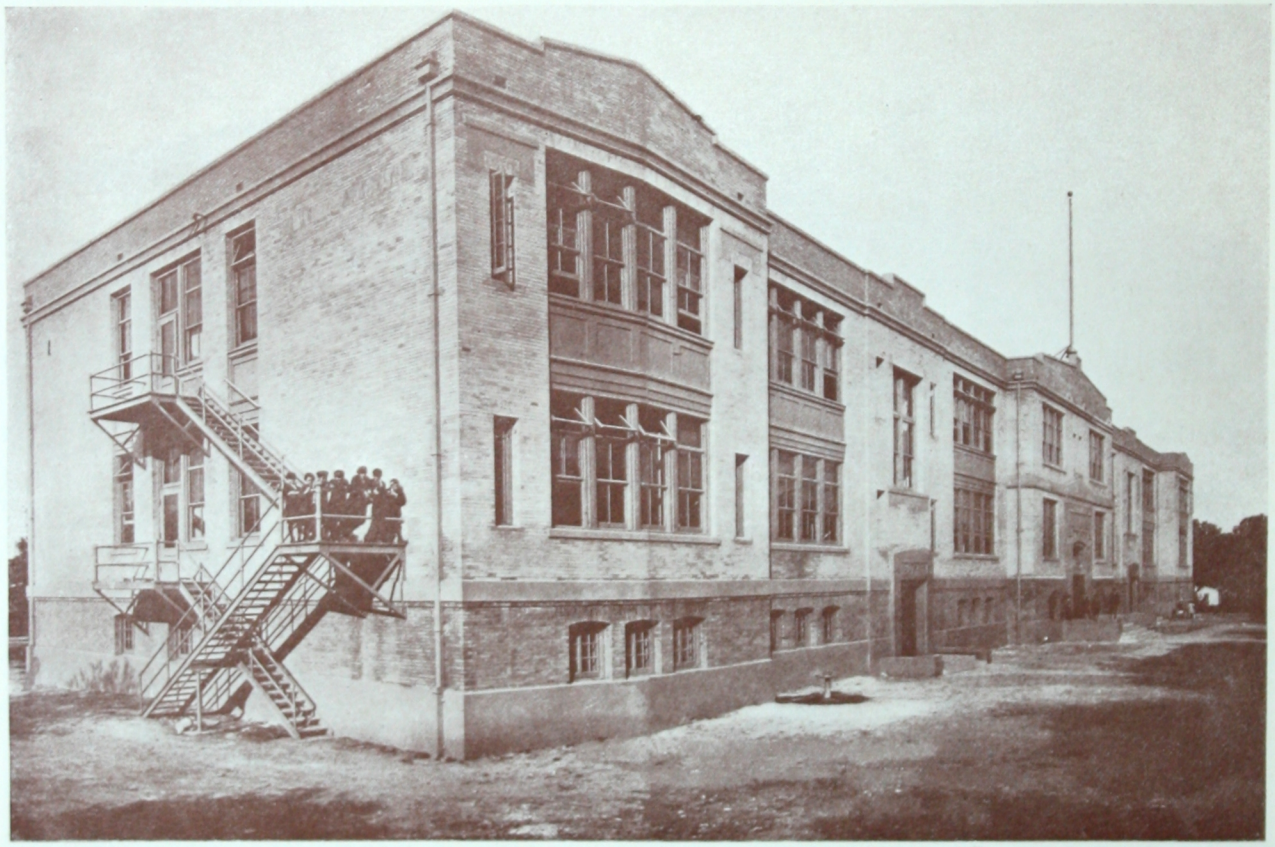
to determining ultimate cost. In a building in which concrete has been consistently used throughout, neglect to carry fire insurance is not serious, since the highest measure of fire protection is built in with the concrete. But because of concrete construction, the saving

in insurance must be credited to the concrete structure when comparing its cost with that of some other type of school building of combustible material.

Depreciation of vital structural parts that cannot readily be reached for repair or maintenance proceeds unless such parts are of a non-depreciating material. With concrete construction, depreciation as well as insurance will be negligible, so it can be seen that first cost does not form a basis for comparison of the true cost of types of school buildings. Any school board that gives sole consideration to first cost and disregards the other factors is simply placing the burden of responsibility upon its successors.

A Comparison Between Permanent and Non-Permanent Construction

IT is a simple matter to fix clearly in mind the difference in ultimate cost of a permanent, non-depreciating, and self-insuring because fireproof building, and a depreciable, burnable one. At the end of a certain period of time, the depreciable or cheaper type will be torn down and replaced by a new building of the same type, probably costing more than the first one. It is evident that a permanent building, costing only 10 or 15 per cent more than a depreciable type, is in reality cheaper than two buildings of the last type. Such a building actually grows stronger with age and will last indefinitely.



FAVRIOT & LIVAUDAIS, *Architects.* REINHART & DONOVAN, *Engineers & Contractors.*

Central School Building, Lake Charles, La.

Structural concrete frame construction on concrete foundation provides a rigid school building free from deterioration of its essential parts.

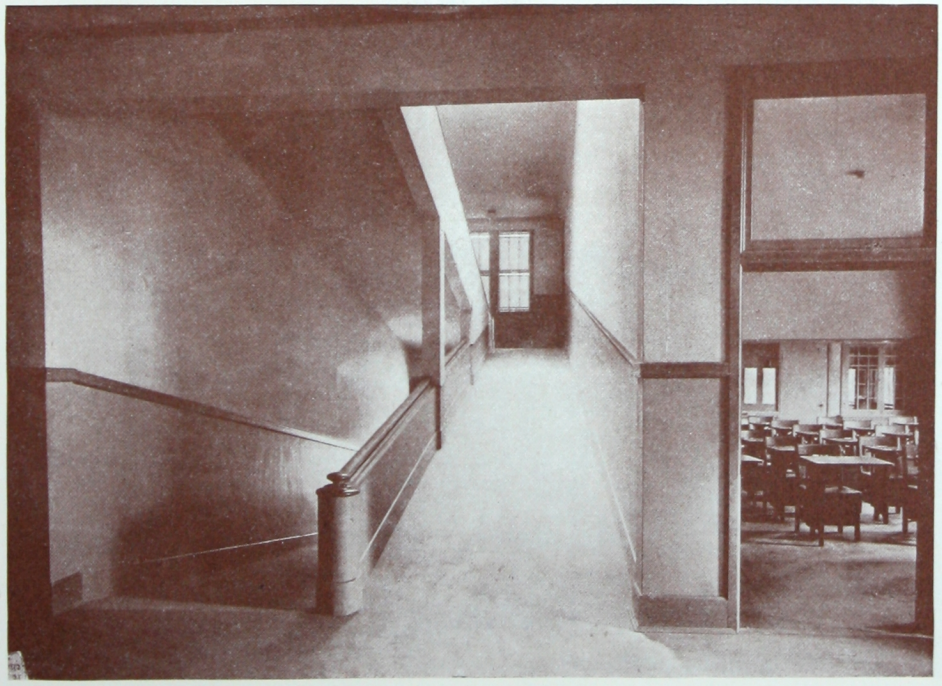
Grammar School, Lawrence School District, Okla.

Rural districts find in concrete construction an economical and fire-safe type for school buildings. The walls of this building have pressed steel studs supporting reinforced concrete slabs. Roof is of concrete slab, plastered on metal lath.

LEONARD H. BAILY, *Architect.* REINHART & DONOVAN, *Engineers & Contractors.*

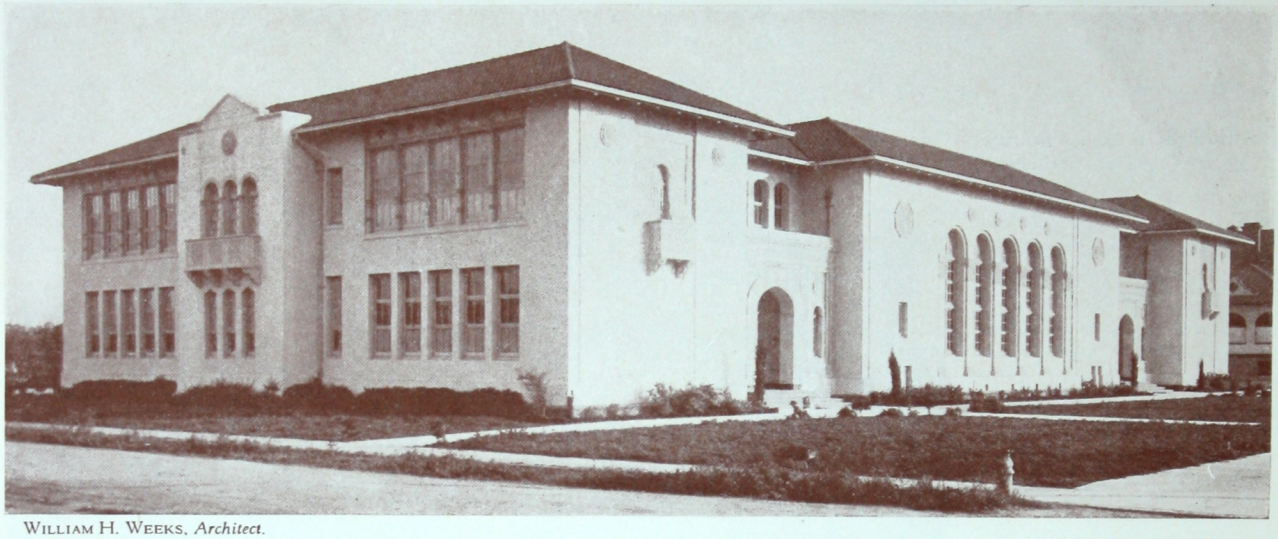
While actual first cost is dependent on local conditions of labor and material supply, it is evident to all that some kinds of material commonly used in school buildings are becoming more difficult to obtain. On the other hand the supply of materials for concrete construction is practically inexhaustible and there is no natural limit on its production. Also a permanent concrete school building can be constructed in many localities for a first cost actually less than other types that may be compared with it.

Maintenance of any structure includes painting, repairing, replacing broken or worn-out parts or members and in general all labor and materials used to keep the building as



Concrete inclines or ramps from floor to floor are used in place of stairs in Healdsburg and Watsonville, Calif. high schools. The floors are of concrete covered with cork carpet. These ramps promote safety of movement within the building.

The Architectural Adaptability of Concrete to School Buildi



WILLIAM H. WEEKS, *Architect.*

High School, Watsonville, Calif.

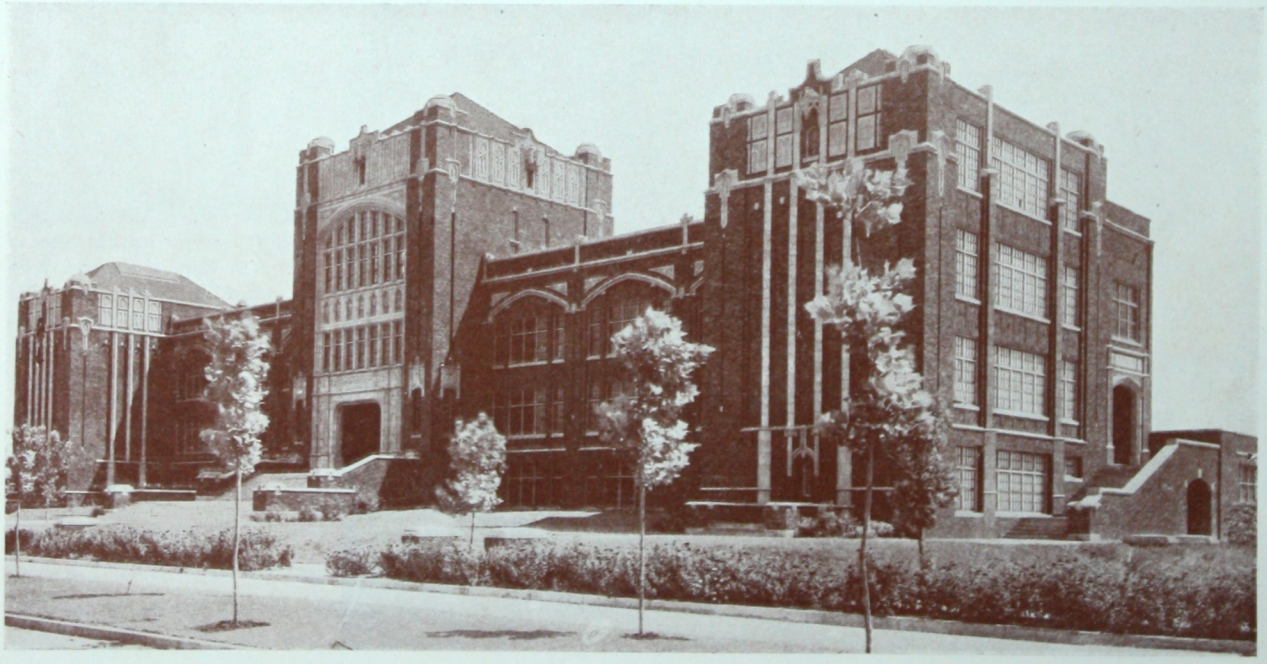
This group of attractive high school buildings illustrates some of the satisfying possibilities of concrete in accepted styles of school architecture in the various parts of the country.

Concrete has proved adaptable to and capable of successfully meeting the requirements of a wide range of varied designs peculiar to different sections of the country.

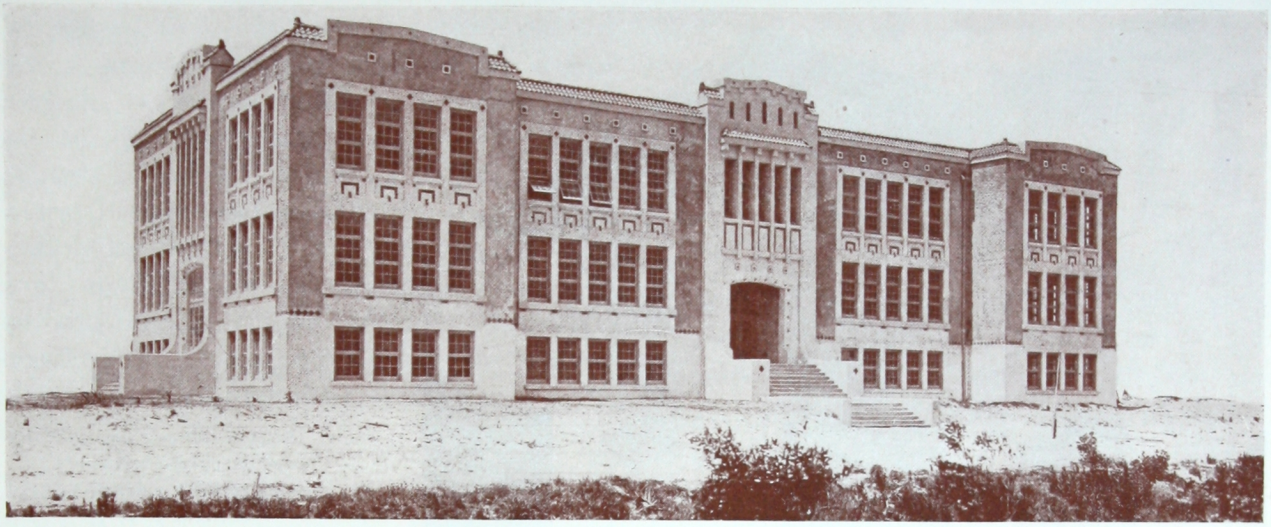
An unusual style of architecture for school buildings has been developed in California, some of which are shown in this book. Details of the entrance and assembly room windows of the Watsonville High School are shown on pages 14 and 15.

Technical High School, Oakland,

Fort Worth High School, Fort Worth, Texas.



Buildings is Shown by this Group of Distinctive Designs



MARK & SHEFTALL, *Architects.*

High School Building, Seabreeze, Daytona Beach, Fla.

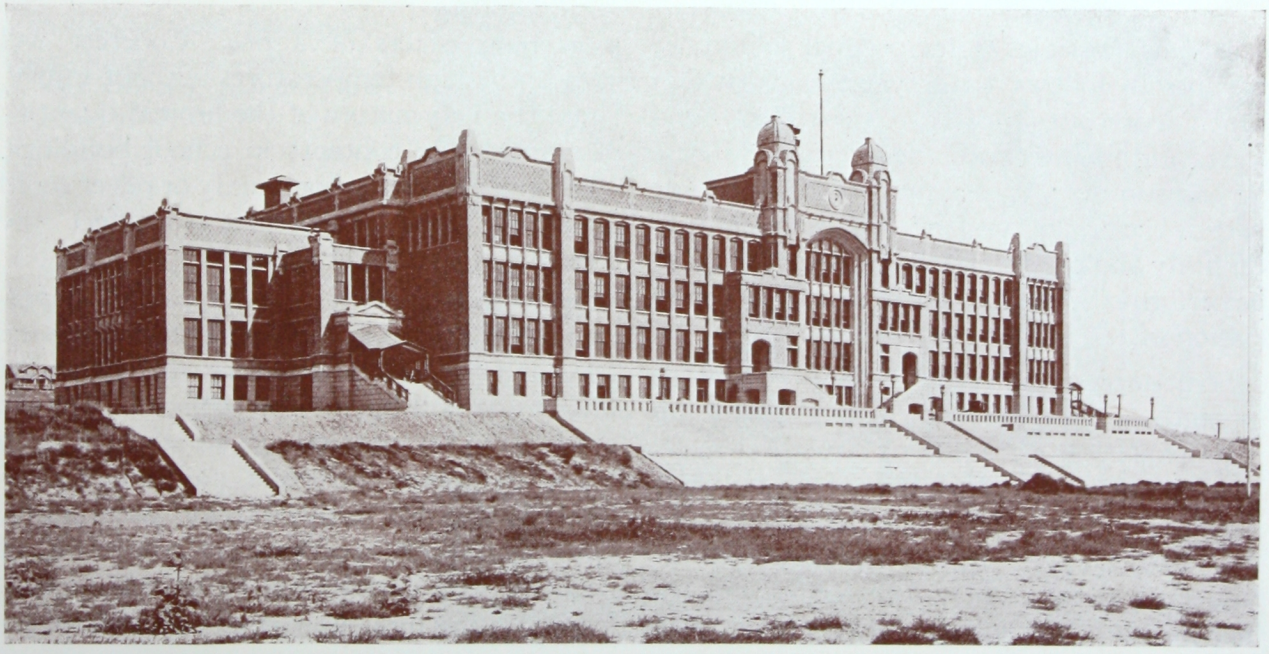
School, Oakland, Calif.

The beauty and strength of the Greek order of architecture is reproduced, with the aid of concrete, in the Technical High School of Oakland, California. The high school buildings of Fort Worth, Texas, and Seabreeze, Daytona Beach, Florida, are examples of the substantial effect obtained by using noncombustible units in combination with monolithic and structural concrete.

Structural concrete frame and concrete brick buildings embody all the requisites of fire-safe construction, and provide for a maximum of daylight and fresh air, as is evidenced by the East Side High School, Salt Lake City, Utah.

East Side High School, Salt Lake City, Utah.

ELDRIDGE & CHESBRO, *Architects.*



Watsonville, Calif.
High School.

Detail of entrance and end pavilion. All ornamentation is of precast concrete in delicate tints.

nearly as possible in its original condition. It naturally follows that a type of construction which depreciates rapidly, requires heavy and increasing maintenance expenditures. These expenditures consume annually a considerable part of the school fund, and regardless of how carefully and systematically maintenance may be performed, it cannot prevent gradual depreciation of the building as a whole.

Structural parts that vitally affect the strength of a building are not accessible for maintenance and the life of structural members determines the useful life of the building. Repairs necessitated by fires that affect structural parts and hence the integrity of the structure, are expensive. However well they may be made, they do not always entirely remove the weakening effects of a fire. Concrete will stand very high temperatures without injury. From the very nature of the limited quantity of combustible contents in school buildings, a fire in a concrete school rarely or never could reach sufficient proportions to affect the strength of structural parts.

Maintenance on a non-fireproofed, depreciable building can do no more than postpone the evil day when the structure will be branded unsafe and will have to be replaced. On the other hand, as concrete grows stronger with age and requires no repairs, painting or similar maintenance; only interior decorations, trim and such portions as may be of depreciable material need to be maintained.

One of the most important requirements of

modern school buildings is that they be clean, well lighted, well ventilated, and therefore provide sanitary, healthful quarters for school children. Concrete buildings are clean and easy to keep clean, which suggests healthful quarters as well as low cost of janitor service. Saving through low maintenance expense made possible by the use of concrete, leaves more money available for extending the school system and likewise results in holding down the school taxes. Concrete buildings represent an addition to the permanent wealth of a community.

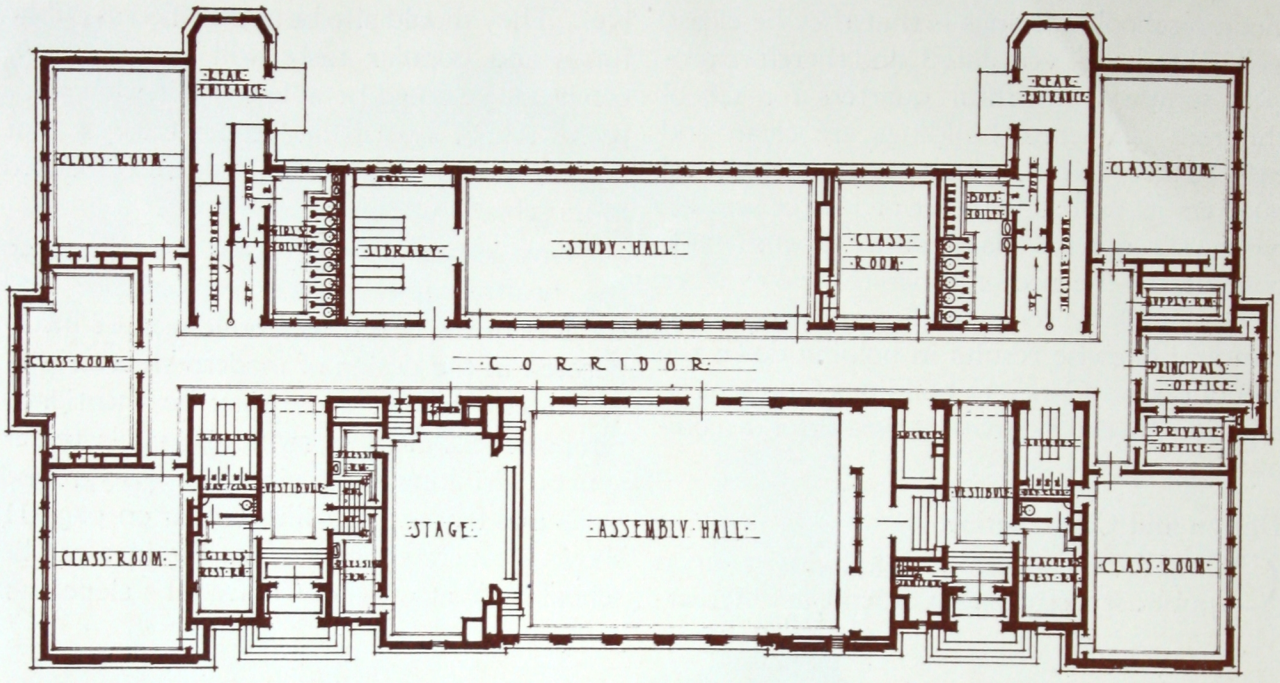
Design and Construction

COMMUNITY pride should insist upon public structures that at least are attractive. They should also be as dignified as public funds and popular taste will permit. Any community should be able to refer with pride to its school system and the merits of that system should so far as possible be evidenced in its school buildings.

Many special features that contribute to the healthfulness, safety, convenience and comfort of modern school buildings are incorporated in the design of modern structures of concrete. Among these may be mentioned ramps instead of stairs, swimming pools, tennis courts, drinking fountains and playground walls and fences. An illustration on page 11 shows a concrete ramp or incline in a public school at Watsonville, Calif. The slope is 2

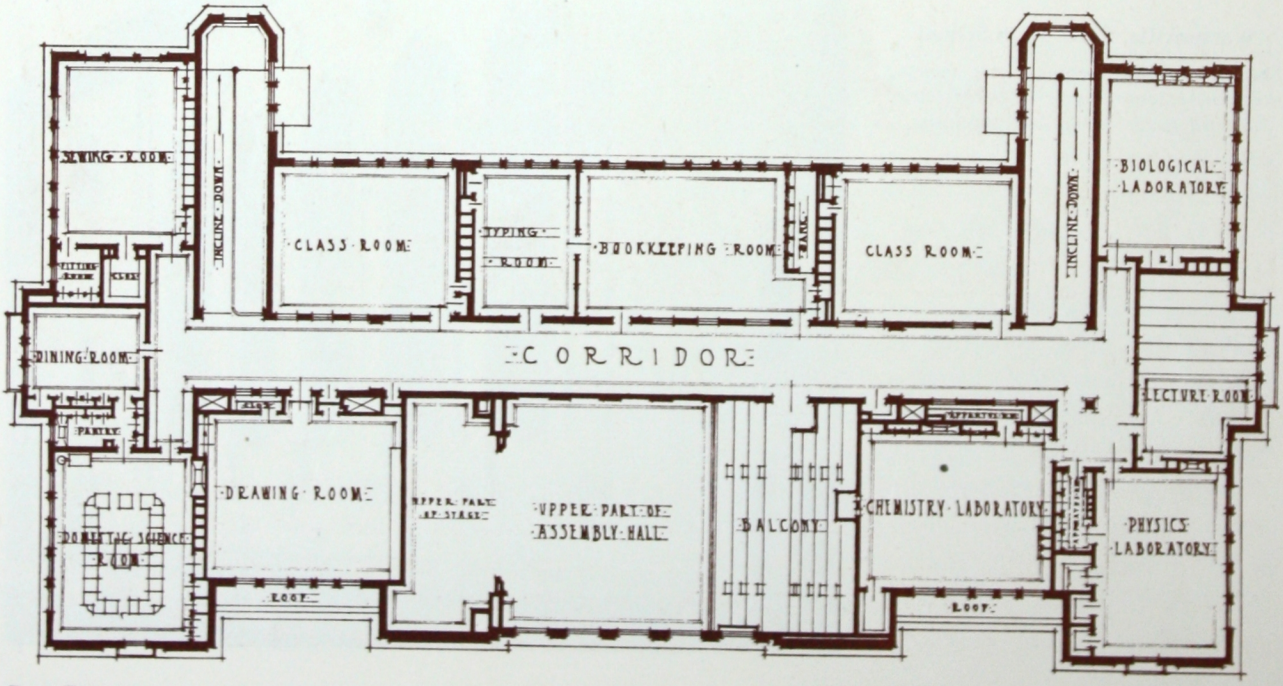
Watsonville, Calif. High School.

Detail of assembly room windows, showing the semi-oriental style of architecture adopted for this high school building.



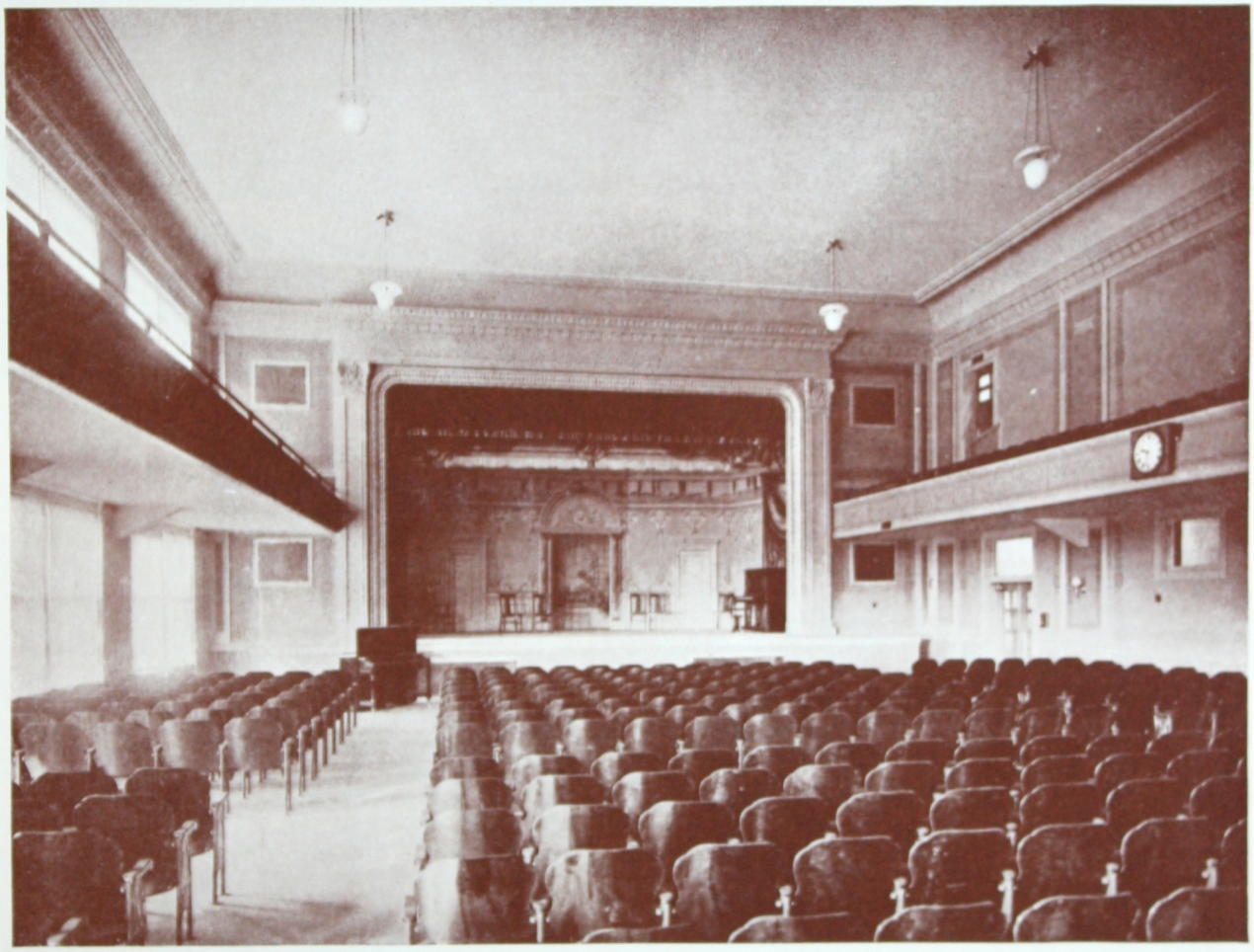
Floor Plans of Healdsburg, Calif., High School.

First floor plan above, second floor plan below. This building like the one at Watsonville is of fireproof construction throughout. All stairways between floors have been replaced by concrete ramps, or inclines, which facilitate movement of pupils through the building.



inches per foot and the ramp is 6 feet wide, including the concrete balustrade. Ramps of this kind instead of stairs have been used extensively by William H. Weeks, architect, in a number of schools he has designed in California. Both materials and labor necessary to its construction are cheaper than for stairways.

booklet are proof of this statement. Graceful, monumental and unassuming school buildings are illustrated which architecturally could not be improved upon, if equalled, by any other structural material. It should also be borne in mind that the cost of most, if not all of these structures, was less than that of any other

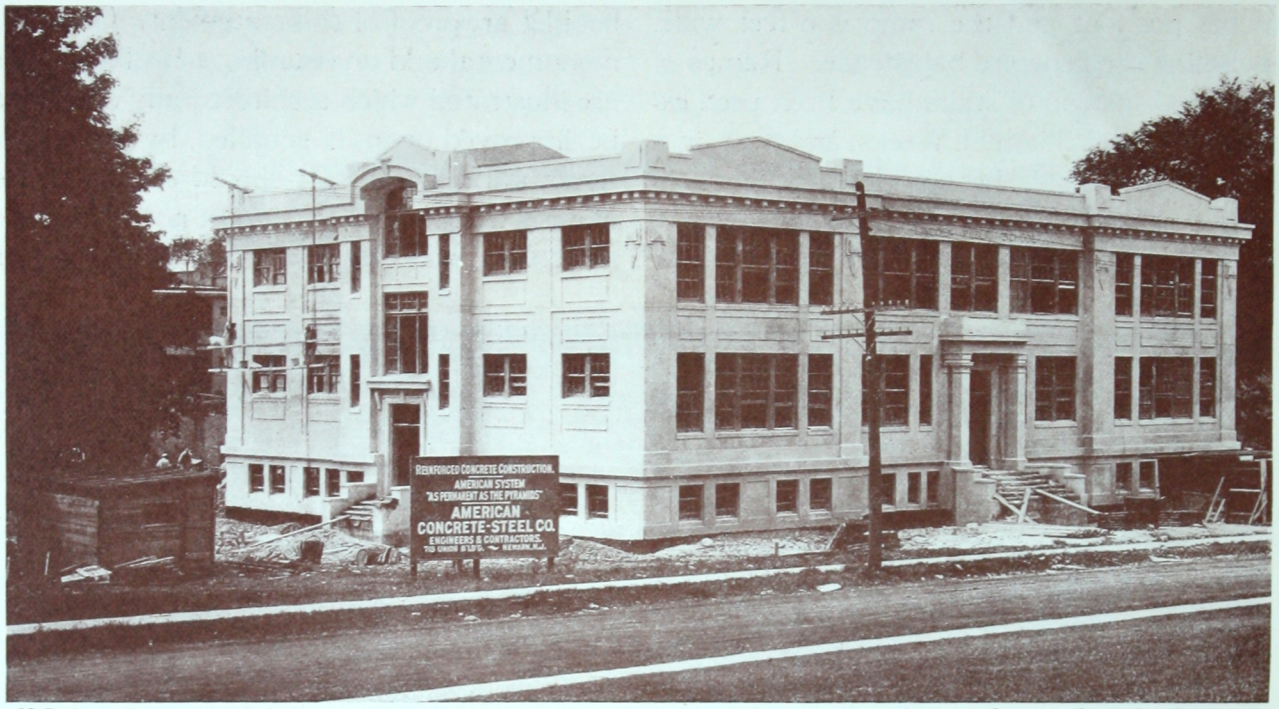


Assembly Hall of High School, Santa Cruz, Calif.

In this hall, freedom from rods and posts is the noticeable feature. The balcony is carried by reinforced concrete cantilever construction.

Concrete has many times proved its adaptability in architecture. There is probably no architectural treatment accepted as in good taste for school buildings, which cannot be worked out most satisfactorily in concrete construction. Many of the illustrations in this type of so-called fireproof construction.

In reinforced concrete design there is a choice between beam and girder and various systems of flat slab construction. The latter requires slightly less material than the former and in general actual construction is simpler.



H. P. ALAN MONTGOMERY, *Architect.* AMERICAN CONCRETE STEEL CO., *Contractors.*

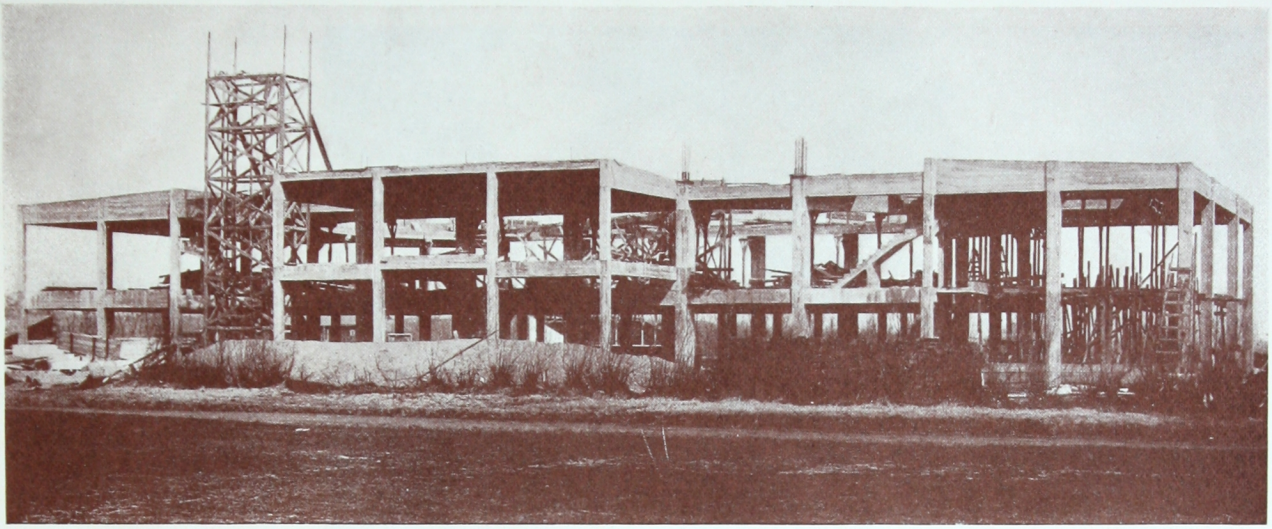
Lincoln Public School, Summit, N. J.

Simple and attractive architectural effect is readily obtained with concrete surface finish.

GARBER & WOODWARD, *Architects.* FERRO CONCRETE CONSTRUCTION CO., *Engineers & Contractors*

Lafayette Bloom School, Cincinnati, Ohio.

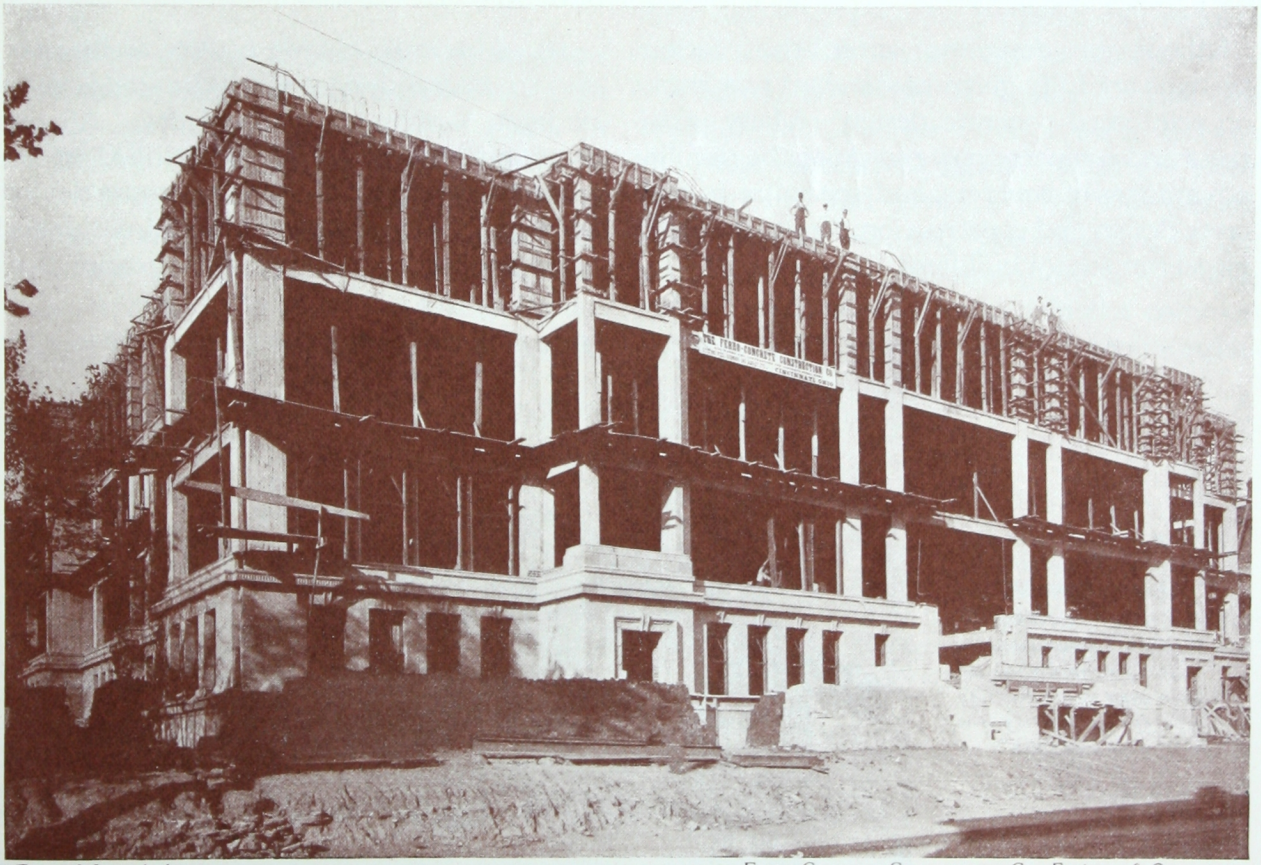
Structural concrete frame in the course of construction.



F. W. REDLICK, *Architect.* REINHART & DONOVAN, *Engineers & Contractors.*

Armory Gymnasium Building, Stillwater, Okla.

Structural concrete frame. Running track is carried on reinforced concrete cantilever construction.



TIETIG & LEE, *Architects.* FERRO-CONCRETE CONSTRUCTION CO., *Engineers & Contractors.*

Fourteenth District School, Cincinnati, Ohio.

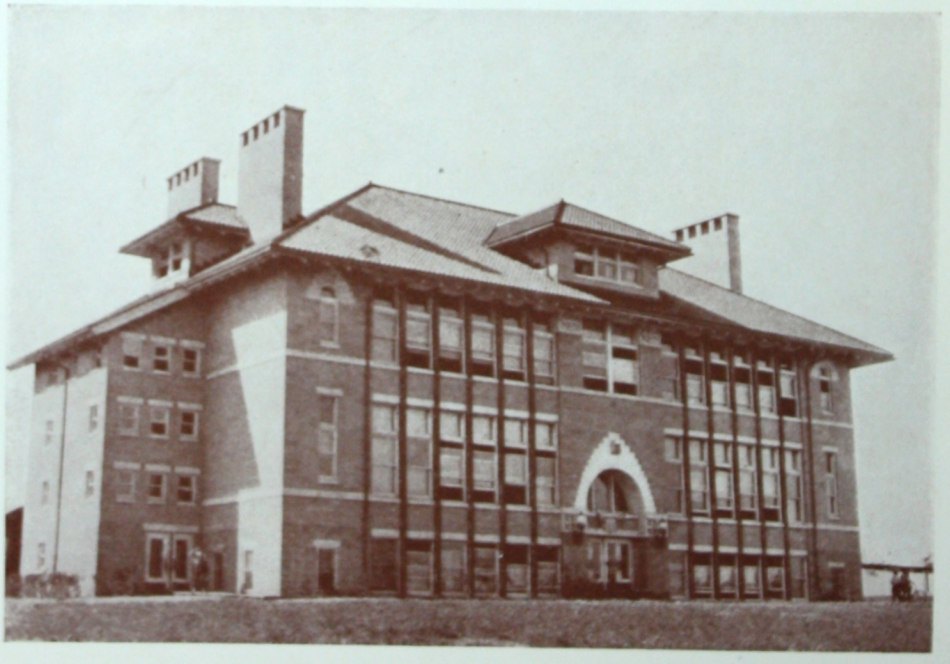
Four-story structural concrete frame, 25 foot spans. Swimming pool of reinforced concrete is provided on the first floor and a playground on the roof.

Public School Building, Stuart, Fla.

Concrete block construction is economical and uses local materials.

Methods of designing after the various systems are fully given in standard text books on reinforced concrete design. Many architects and engineers now recognize the peculiar advantages of concrete, and specialize in concrete design and construction. Some specialize largely in school buildings.

In addition to having correct architectural and structural design, school buildings should be light, sanitary, warm and dry. All these requirements can readily be fulfilled by concrete construction. Concrete permits daylight lighting. Floor loads are transmitted directly or indirectly to columns, and bearing walls



Modern Concrete School Building at Mooseheart, Ill.

The recognized fireproof qualities of monolithic concrete floors and concrete block walls of this building are reflected by its low insurance rates.

Roselyn Farm School,
Carnegie, Pa.
Small fire-resistive concrete schoolhouses are ultimately most economical.

need not be used. Entire space between columns and floors may therefore be flooded with daylight.

Finished concrete floors and walls present an unbroken, hard, durable, impervious, hence sanitary surface. There are no cracks or crevices for the collection and lodgment of filth. Objections to uncovered concrete floors because of their hard, unyielding surface, are largely unfounded. However, if it is desired to use another type of floor surface, various kinds of linoleum or other floor coverings are available. A wooden floor may be put over concrete by embedding nailing strips in the floor slab when concrete is placed, but reduces the factors of fire-safety and sanitation.

The modern types of concrete block are especially suitable for exterior walls of even the most pretentious school building. Their uniform size and comparatively large dimensions make for ease and speed of laying up the wall and keeping it plumb and level. The hollow space usually molded in the common types of block assists in securing good insulat-

Public School Building,
Sabeka, Minn.
Concrete and concrete block construction meets all climatic conditions.

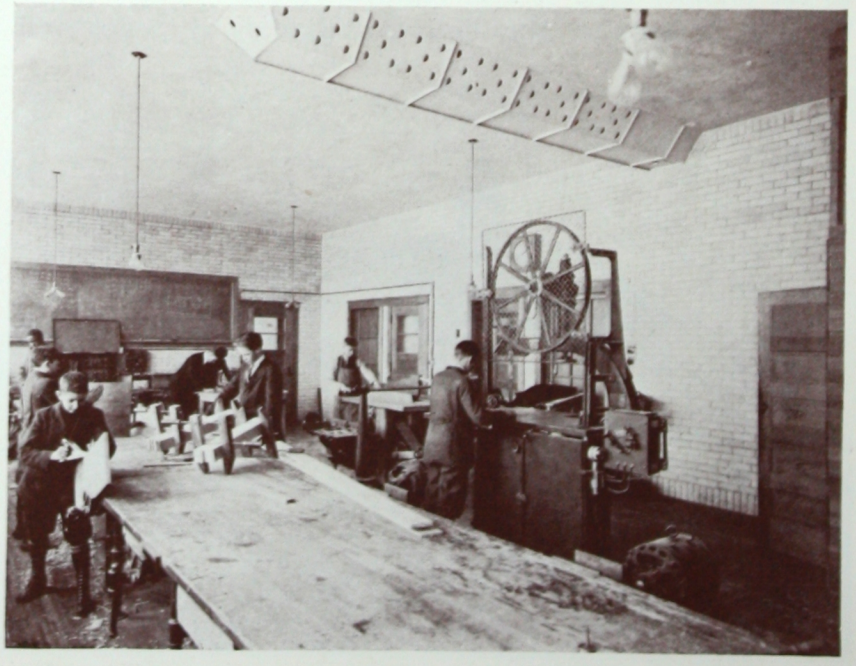
SNOWDEN ASHFORD, *Municipal Architect.* HAMMETT FIREPROOFING CO., *Contractors.*

Reinforced Concrete Stadium of the New Central High School, Washington, D. C.

This stadium seats 6,000 persons and is fire and accident proof in every respect.

ing qualities, but in cold climates all masonry walls should be furred, lathed and plastered on the interior.

A number of economical methods have been developed for constructing double walls of monolithic concrete. Very thorough insulation of walls is accomplished through the introduction of such a dead air space within the wall. Care must be taken that no air passages exist around door and window frames, thus permitting free circulation of air in the space in the wall. The dead



Manual Training Department, Morgan Park School, Duluth, Minn.

Concrete construction, including concrete brick, removes the fire hazard due to combustible materials or electrical equipment used for instruction in manual training and domestic arts.

air space prevents the interior face of the wall from becoming cold during extreme low temperature and likewise checks radiation of heat from the building through the wall.

Concrete buildings have peculiar advantages from the standpoint of actual construction. Most of the materials required are of local origin and with the modern methods now applied, the speed and ease with which concrete buildings may be erected are remarkable. Usually funds for school buildings are not appropriated until the need for the building has been definitely demonstrated and probably become urgent. Therefore once a new school is decided upon, there is insistent demand for its early completion. If concrete is specified, the work can be under way as soon as preliminary or foundation plans have been completed.

Because most of the materials and a great deal of the labor required in concrete construction can be obtained locally, the community using concrete for its public buildings is largely paying its own money back to itself. In other words, the greater portion of the money remains at home.

Remember

SOME of the vital features that a school building must possess are protection against fire, storm and earthquake.

It must be easy to keep clean, light, healthful and comfortable.

It should be of a type of construction that will protect the taxpayer's investment from loss by the elements.

It should not be subject to depreciation nor require heavy maintenance expenditures.

It should add to the permanent wealth of the community.

Architecturally it should promote community pride.

It should be low in ultimate cost.

All of these requirements are fulfilled with concrete construction.